

United International University

Department of CSE

Project Proposal Report

Course Name and Code: Microprocessors and Microcontrollers Laboratory (CSE 4326)

Group No: 03

Project Title: VisionMate

Motivation: We chose this project to empower visually impaired individuals by enhancing their independence, safety, and confidence through innovative assistive technology. VisionMate leverages IoT, AI, and cost-effective design to provide real-time navigation, obstacle detection, and emergency alerts, making it a significant step toward inclusivity and improving quality of life. The motivation behind this project are given below:

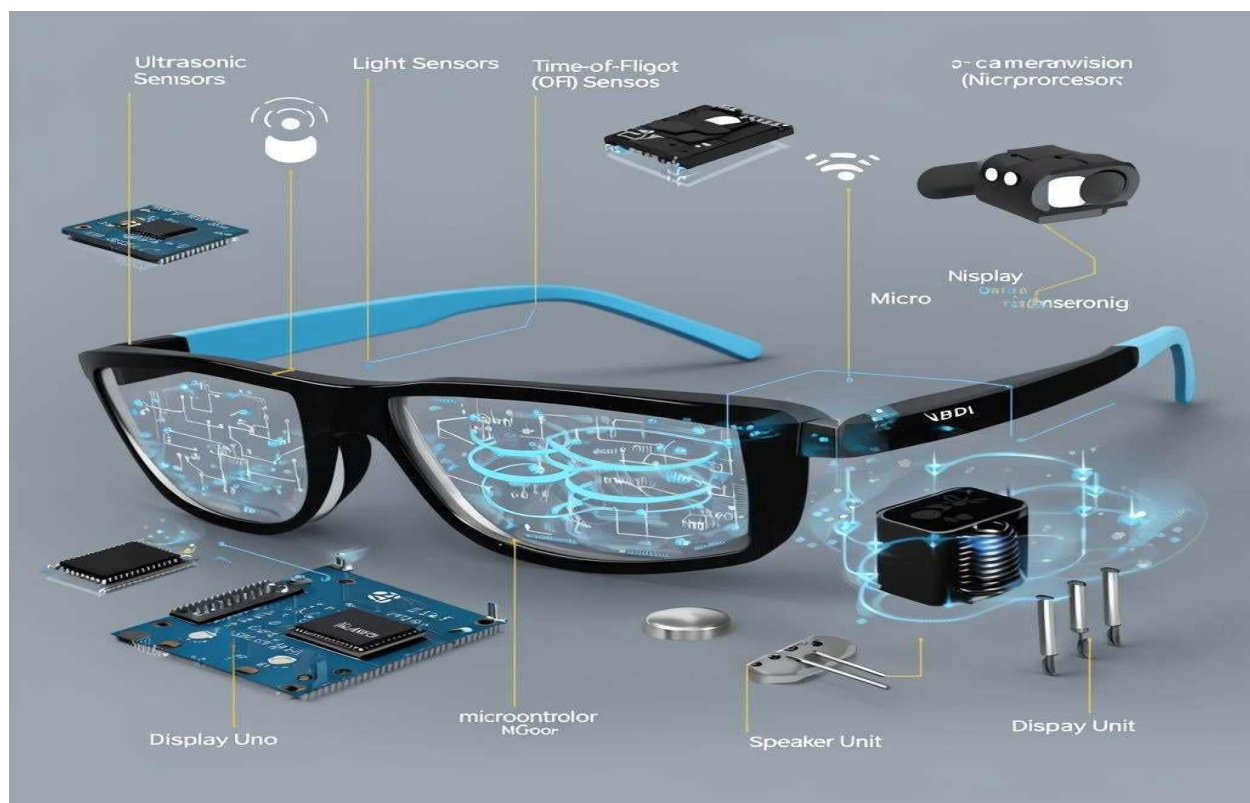
- 1. Empowering the Visually Impaired Community:** Millions of individuals globally face challenges due to visual impairments, limiting their independence in daily activities. This project aims to provide a sense of autonomy and confidence, enabling them to navigate their surroundings safely and effectively.
- 2. Bridging Technological Gaps in Accessibility:** Despite advancements in assistive technologies, many solutions remain either too expensive or lack comprehensive features. VisionMate is designed to be a cost-effective, compact, and user-friendly device, making cutting-edge technology accessible to a broader audience.
- 3. Safety and Security:** The project incorporates features like real-time obstacle detection and emergency SOS functionality, addressing critical safety concerns for visually impaired individuals. By integrating GPS and GSM modules, it ensures that users can quickly reach out for help during emergencies.
- 4. Harnessing IoT and AI for Good:** This project demonstrates the potential of IoT and AI to solve real-world problems and improve quality of life. It encourages innovation in the field of assistive technology and sets a benchmark for future advancements.

How It Will Contribute to Society: The VisionMate is not just a project; it is a step toward making the world more inclusive, safe, and navigable for visually impaired individuals. The social impact of this project is given below:

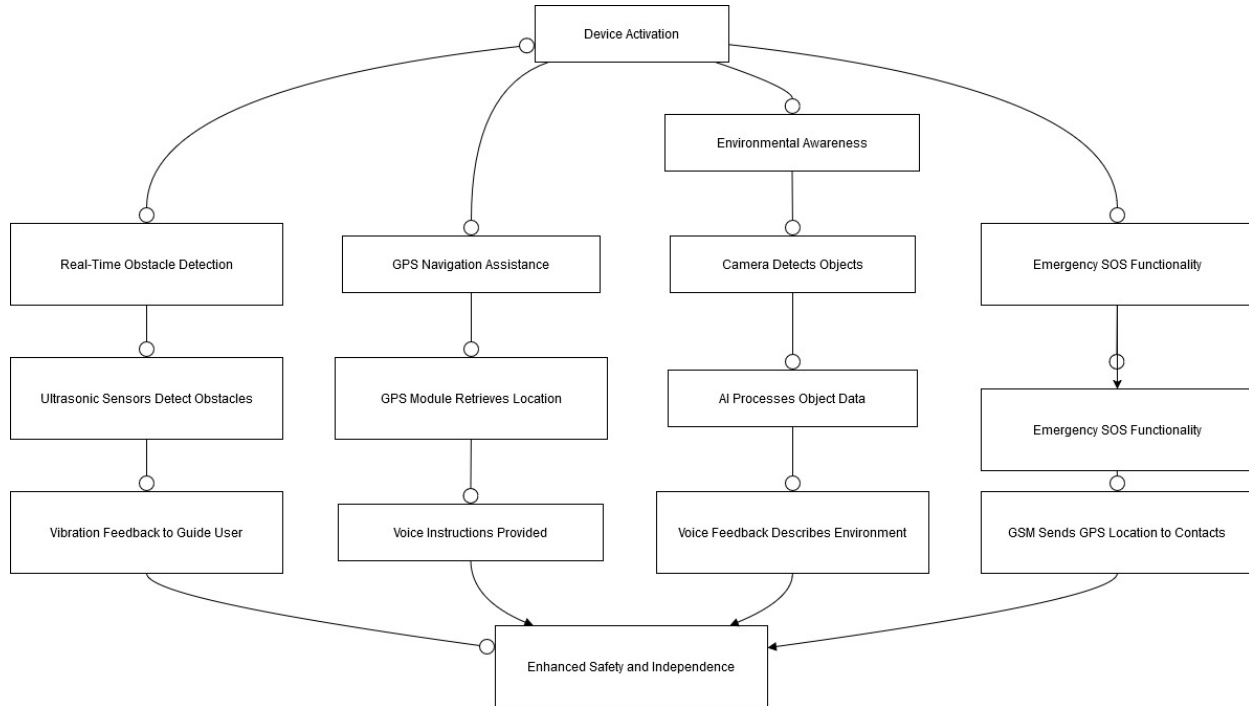
1. **Social Inclusion:** It helps visually impaired individuals actively participate in social, educational, and professional activities, breaking down barriers to inclusion.
2. **Community Support:** Families and caregivers can benefit from the peace of mind provided by the SOS functionality and enhanced independence of their loved ones.
3. **Enhanced Safety:** With its obstacle detection and emergency SOS features, the device ensures the user's safety in unfamiliar or potentially hazardous environments.
4. **Encouragement for Further Innovation:** VisionMate can inspire other innovators and researchers to explore and develop technologies that cater to differently-abled individuals.

Introduction: Our project, VisionMate, is an IoT-based wearable designed to assist visually impaired individuals in navigating their surroundings safely and independently. This device addresses key challenges such as avoiding obstacles, identifying objects, and navigating unfamiliar environments. It also includes an SOS alert feature to ensure users can seek help during emergencies. VisionMate integrates technologies like sensors, GPS, and AI to provide real-time feedback and guidance. Through this project, we aim to enhance the safety, confidence, and independence of visually impaired individuals in their daily lives.

Diagram of projects VisionMate: The projected diagram of VisionMate is given below:



System flowchart: The system flowchart is given below:



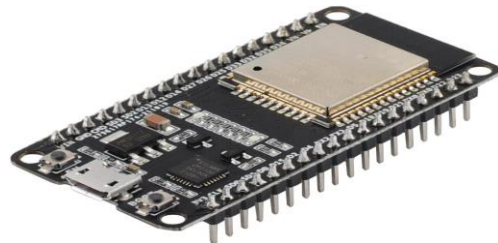
Features of projects VisionMate: The main features of our projects are given below:

1. **Real-Time Obstacle Detection:** We will use ultrasonic sensors to detect obstacles in front and to the sides. This feature provides haptic feedback through vibration motors to guide users safely.
2. **GPS-Based Navigation Assistance:** We will integrate a GPS module to provide navigation routes. It provides voice instructions delivered via a speaker.
3. **Environmental Awareness with Object Identification:** We will use a camera module and AI processing to identify objects (e.g., doors, stairs). It describes surroundings through voice feedback via a speaker.
4. **Emergency SOS Functionality:** This feature ensures the safety of the visually impaired user by allowing them to send an SOS alert in emergencies. The system integrates a panic button, a GSM module, and a GPS module to deliver critical information effectively. This feature significantly enhances the wearable's utility by addressing the safety concerns of visually impaired users.
5. **Emergency Trigger:** Automatically or manually sends the user's last known location to a verified source via SMS or a cloud platform in case of an accident or low battery.
6. **Battery Monitoring with Alerts:** Continuously monitors battery levels and provides notifications or emergency location updates when power is critically low.

Apparatus/Hardware Components: The main apparatus such as hardware components, sensors are given below:

1. Microcontroller

- Raspberry Pi 4 (8 GB)
- ESP 32S



2. Sensors

- Camera sensor
- Time-of-Flight (ToF) Sensors

3. Actuator

- Vibration Motor (Coin Shape)

4. Display Unit

- Transparent OLED Display

5. Power Supply

- Li-ion Battery

6. GPS Module

7. Button

8. Speaker

Conclusion: In conclusion, VisionMate is a compact, innovative IoT wearable designed to enhance the safety and independence of visually impaired individuals. By addressing critical challenges, it aims to make daily life easier and more inclusive.